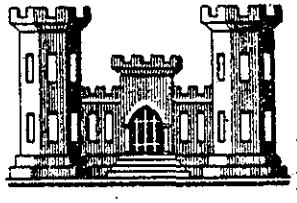
EAST MACHIAS RIVER BASIN
EAST MACHIAS, MAINE

CHASE MILL DAM
ME-00335

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

MAY 1979

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

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Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,
East Machias River Basin
East Machias, Maine
Chase Mill Stream

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The dam is about 10 ft. high and 45 ft. long. The dam is assessed to be in fair condition. It is intermediate in sizw with a hazard potential classification if low. There are various remedial measures which should be implemented by the owner.

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EAST MACHIAS RIVER BASIN

EAST MACHIAS, MAINE

CHASE MILL DAM, East...

ME-00335

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

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PHASE I INSPECTION REPORT

ME-00335

CHASE MILL DAM

EAST MACHIAS

WASHINGTON COUNTY, MAINE

CHASE MILL STREAM

November 28, 1978

BRIEF ASSESSMENT

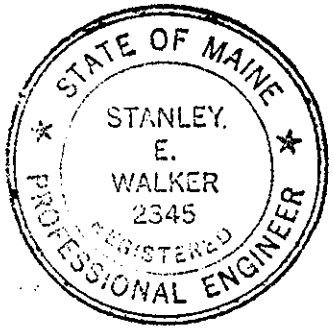
The Chase Mill Dam is a concrete buttress wall structure. The dam is approximately 10 feet high and 45 feet long. It consists of 3 stop log outlets and 3 broad crested weir spillway sections. The spillway sections are approximately 34 feet long, total, and have provisions for stop logs. Only the most northerly section had stop logs in at the time of inspection. Immediately downstream of the dam is a highway bridge with an opening approximately 24 feet wide and 11.5 feet high.

Based on the visual inspection, Chase Mill Dam is assessed to be in fair condition. Major concerns regarding the safety of the dam include: low areas in embankment between the northerly abutment and fishway and leakage through the spillway sections.

Based on size (intermediate) and hazard classification (low), the test flood is 1/2 the probable maximum flood (1/2 PMF). The total project discharge (spillway capacity plus natural outlet flows) with water suface at the top of the dam is about 950 cfs or about 42 percent of the routed test flood. The routed test flood outflow of 2250 cfs would overtop the dam by about 1.5 feet, but the roadway immediately downstream of the dam would not be overtopped.

The following recommendation and items of remedial maintenance, as outlined in Section 7 should be implemented within one year after receipt of this report by the owner. The need and appropriate construction details for a facility to provide access to the stop logs during high flow should be evaluated and developed by a qualified engineer, and implemented as found necessary. The following items of remedial maintenance should also be performed. 1) seal the joint between the

spillway weir and the sill and abutment; 2) fill and protect against erosion the low areas adjacent to the fishway; 3) provide around-the-clock surveillance during heavy runoff periods; and 4) have inspections of the dam made by a qualified engineer once every 2 years.



EDWARD C. JORDAN CO., INC.

Stanley E. Walker, P.E.
Project Officer

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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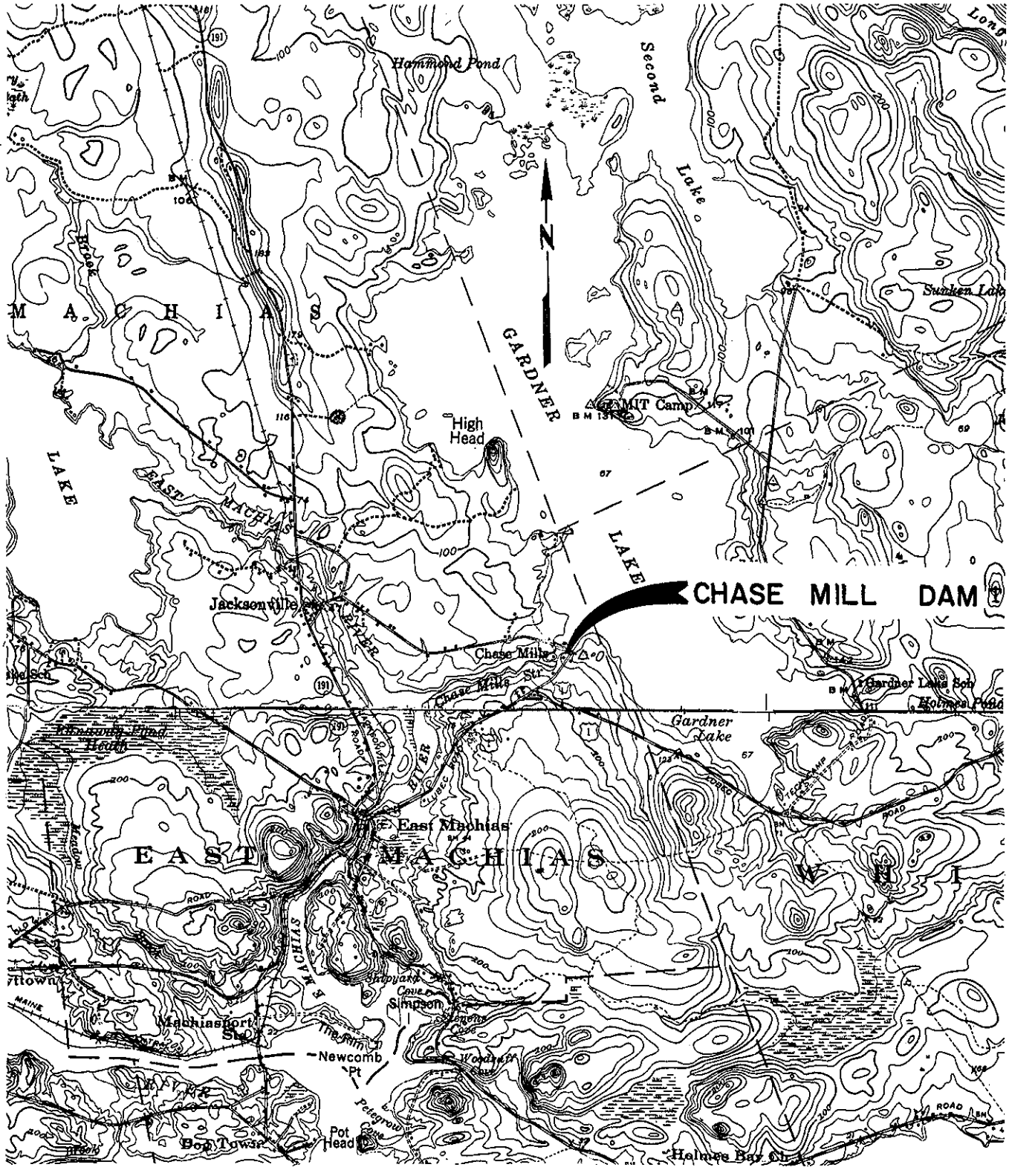


U.S. GEOLOGICAL SURVEY

GARDNER LAKE , ME. QUADRANGLE
MACHIAS , ME. QUADRANGLE

0 1 2 3 MILES

EDWARD C. JORDAN CO., INC. PORTLAND, MAINE	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

CHASE MILL DAM

LOCATION MAP

CHASE MILL STREAM — MAINE

20799	17	SCALE	AS SHOWN
		DATE	MARCH 1979

PHASE I INSPECTION REPORT

CHASE MILL DAM

SECTION 1
PROJECT INFORMATION

1.1 GENERAL

a. Authority. Public Law 92-367, August 8, 1972, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a National Program of Dam Inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Edward C. Jordan Co., Inc. has been retained by the New England Division to inspect and report on selected dams in the states of Maine and New Hampshire. Authorization and notice to proceed were issued to Edward C. Jordan Co., Inc. under a letter of December 1, 1978 from Max B. Scheider, Colonel, Corps of Engineers. Contract No. DACW33-79-C-0017 has been assigned by the Corps of Engineers for this work.

b. Purpose.

(1) To perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.

(2) To encourage and prepare the states to initiate effective dam safety programs for non-Federal dams.

(3) To update, verify and complete the National Inventory of Dams.

1.2 DESCRIPTION OF PROJECT

a. Location. The Chase Mill Dam is located at the outlet of Gardner Lake in the Town of East Machias, Maine, N44°-45.3', W 67°-21.7'.

b. Description of Dam and Appurtenances. Chase Mill Dam is a concrete buttress wall structure. It is approximately 10 feet high and is about 45 feet long. The spillway consists of three controlled broad-crested weir sections with two sections having approximately the same concrete crest elevation. There are three deep stop log outlet sections. See plan-profile sketch in Appendix B for location of individual sections. Stop logs were not being used in spillway sections 1 and 2 at the time of inspection.

Appurtenant to the north end of the dam is a dentated fishway. The embankment fill adjacent to the fishway is low in several areas and appears to be overtopped during heavy flow periods.

c. Size Classification. The Chase Mill Dam is classified as an intermediate size dam. It has a storage capacity of about 43,000 acre-feet and a height of approximately 10 feet. According to the Corps of Engineers "Recommended Guidelines for Safety Inspection of Dams," a dam with storage capacity greater than 1000 acre-feet but less than 50,000 acre-feet or a height greater than 40 feet but less than 100 feet is classified as an intermediate size dam.

d. Hazard Classification. The Chase Mill Dam is classified as having a low hazard potential. The peak flow from the hypothetical failure of the dam was estimated to be about 1450 cfs based on guideline procedures provided by the Corps of Engineers. Flood waters would likely be completely contained within the downstream river channel. It appears that no inhabitable structures would be damaged.

e. Ownership.

Current: Town of East Machias
City Hall
East Machias, Maine

Contact: Mariner Dennison
East Machias Selectman
(603-255-8598)

f. Operator.

None

g. Purpose of Dam. The dam is presently being used to control the water level at Gardner Lake for recreational purposes.

h. Design and Construction History. Very little design and construction data pertinent to this dam was available. According to an East Machias selectman the dam piers were constructed before 1934 for the purpose of supporting fish screens. However, in the late 1950's or early 1960's the Gardner Lake Club had the concrete spillway wall installed to control the water level at Gardner Lake after the breaching of the old Mill Dam immediately downstream.

i. Normal Operating Procedures. The Chase Mill Dam has no formal operating and maintenance program. Stop logs are manually added or removed as required to achieve the desired water elevation in Gardner Lake.

1.3 PERTINENT DATA

a. Drainage Areas. The drainage area above Chase Mill Dam is about 53 square miles. The watershed is primarily gently sloping forested terrain. Gardner Lake, which is impounded by Chase Mill Dam, has an area of about 8.2 square miles (5250 acres), which is approximately 15.6 percent of the drainage area.

b. Discharge at Damsite. No record of high water was available. Chase Mill Dam hydraulically controls the east outlet of Gardner Lake. West outlet #1 located about 300 feet west of the dam, is controlled by a 4 foot diameter culvert under the roadway. Discharge through this culvert is insignificant when compared to total project discharges. About 600 feet west of the dam is another natural outlet, west outlet #2, also controlled by a 48 inch diameter culvert under the roadway, that aids in the passage of flood flows when the water surface is above the top of the dam. The following are pertinent discharges for Chase Mill Dam:

(1) Outlet Works - The outlet works consist of three stop log sections. No facility is provided for removal of stop logs during periods of high flow.

(2) The maximum flood at the damsite is unknown.

(3) Ungated spillway capacity with water surface at the top of the dam is about 550 cfs.

(4) Westerly outlets #1 and #2 total capacity with water surface at top of the dam is about 400 cfs.

(5) Gated spillway capacity is not applicable.

(6) Total project discharge at test flood (1/2 PMF) elevation of 70.8 is 2250 cfs.

c. Elevation. The survey datum was converted to MSL datum by assuming that the spillway crest is equal to elevation 67 (normal water surface elevation for Gardner Lake), as shown on the U.S.G.S. map of Gardner Lake, Maine quadrangle.

ITEM	ELEVATION (FEET ABOVE MSL)
Top of dam	69.5
Top of road	Varies from 73.8 immediately downstream of dam to 62± at west outlet #2
Test flood (1/2 PMF) pool	70.8
Full flood control pool	N/A
Recreation pool	67.0
West outlet #1 invert	69.0
West outlet #2 invert	61.8
Streambed at centerline of dam	60.5
Maximum tailwater	Unknown

d. Reservoir Reach

ITEM	LENGTH (MILES)
Maximum Pool	8.3
Recreation Pool	8.3
Flood Control Pool	N/A

e. Reservoir Storage Capacity

ITEM	(ACRE-FEET)
Normal Water Surface Pool (Elev. 67)	27,500
Top of Dam	41,300
Test Flood (1/2 PMF)	49,200

f. Reservoir Surface Area

ITEM	(ACRES)
Recreation Pool	5,250
Flood Control Pool	N/A
Spillway Crest Pool	5,250
Test Flood (1/2 PMF) Pool	6,150
Top of Dam	5,800

g. Dam

Type - The dam is a concrete buttress wall structure.

Length - The length between abutements is about 45 feet.

Height - 10 feet from top of dam to stream bed.

Top Width - Approximately 1 foot at spillway crest.

Side Slopes - see plan and cross-sections in Appendix B-1.

Zoning - Not applicable.

Impervious Core - Not applicable.

Cutoff - Concrete sill placed on bedrock or into streambed.

Grout Curtain - None.

h. Diversion and Regulating Tunnel. Not applicable.

i. Spillway

Type - The spillway consists of three controlled broad-crested weir sections with two sections having

approximately the same crest elevation (see plan-profile drawing in Appendix B for location of individual sections.

Length - Section #1 - 18.5 feet
Section #2 - 9.7 feet
Section #3 - 6.1 feet

Crest Elevation - Section #1 - 67.0 (MSL)
Section #2 - 67.0 (MSL)
Section #3 - 65.5 (MSL)

Gates - None.

Upstream Channel - The approach channel to the spillway is clear and unobstructed.

Downstream Channel - The channels below the dam and the two west outlets are narrow and slope at about 3.5 percent. The three channels join about 1/4 mile downstream of the dam. The streambeds are composed primarily of gravel and cobbles. The channel below the dam, as shown in the overview photograph, is constricted by a bridge, located about 25 feet downstream of the dam. The bridge has an opening approximately 24 feet wide by 11.5 feet high. When the water surface reaches elevation 71.0, about 1.5 feet above top of dam, the bridge channel opening becomes the hydraulic control.

j. Regulating Outlets.

(1) Inverts: Stop Log Bay #1 - 60.5 (MSL)
Stop Log Bay #2 - 62.0 (MSL)
Stop Log Bay #3 - 62.0 (MSL)

(2) Size: Stop Log Bay #1 - 4 feet wide
Stop Log Bay #2 - 4 feet wide
Stop Log Bay #3 - 3 feet wide

(3) Description - Stop log bays

(4) Control Mechanism - None.

SECTION 2

ENGINEERING DATA

2.1 DESIGN

No design data were available for the Chase Mill Dam.

2.2 CONSTRUCTION

No engineering data were available regarding construction of the Chase Mill Dam.

2.3 OPERATION

No engineering operational data were available.

2.4 EVALUATION

a. Availability. There are no engineering data or plans available that would be useful in evaluating the integrity of Chase Mill Dam.

b. Adequacy. The lack of engineering data did not allow for a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection and engineering judgment.

c. Validity. Not applicable.

SECTION 3

VISUAL INSPECTION

3.1 FINDINGS

a. General. The Chase Mill Dam is a concrete butress-wall structure. It is located at the outlet of Gardner Lake and is apparently used for maintaining the water level in Gardner Lake for recreational purposes. The dam closes the major outlet from Gardner Lake, however, two smaller outlets, west outlets #1 and #2, are located 300 feet and 600 feet west of the dam, respectively.

b. Dam.

(1) Structural - the dam consists of a concrete structure forming the spillways and control outlets and a road embankment which forms the embankment of the dam. The road is located just downstream of the concrete section and follows the shoreline of Gardner Lake. See Appendix A, B, and C for detail inspection notes, sketches of the structure, and photographs. The inspection resulted in the following major findings:

(a) Major leakage is occurring through the joint between the spillway weir and the foundation sill. See Photographs 3 and 4. This leakage is apparently coming through the joint directly from the upstream face of the dam.

(b) The concrete surfaces on the structure are in generally good condition with very little spalling or erosion.

(c) There are low areas in the embankment fill adjacent to the fishway. It appears that these areas are overtopped during high flow conditions. The low area east of the fishway does not appear to be subject to erosion due to the presence of bedrock. However, the low area west of the fishway and at the toe of the highway fill appears to be subject to erosion although no serious erosion has occurred.

(d) It appears that removal of the stop logs would be very difficult during high flow conditions.

(2) Hydraulics - At the time of visual inspection November 28, 1978, the lake surface was approximately elev. 65.3, about 1.7 feet below the spillway crest. There are three stop log bays which form control outlets for the dam. The north portion of the spillway was also furnished with stop logs. All stop logs have to be manually removed. Although spillway sections #1 and #2 were not provided with stop logs, supports and slots were provided for the installation of stop logs.

Flow was occurring through the fishway and center stop log bay. This bay had a lower crest elevation due to stop log removal. Flow was occuring through leaks in the dam at a rate of about 5 cfs. West outlet #1 was also flowing. There was no flow in west outlet #2.

c. Appurtenant Structures. The concrete fishway, located at the north end of the dam, appears to be in good condition. The embankment areas adjacent to the fishway are low and appear to be overtopped during high flow periods. However, there appeared to be no serious erosion.

d. Reservoir Area. Gardner Lake, which is about 5250 acres, forms the reservoir for Chase Mill Dam. The lake has a forested shoreline, as shown in Photograph 2. There are several cottages and year round residences on the lake. The potential for slope failure above the dam appears minimal.

e. Downstream Channel. The channels below the dam and the two west outlets are narrow and slope at about 3.5 percent. The three channels join about 1/4 mile downstream of the dam. The streambeds are composed primarily of gravel and cobbles. The channel below the dam is constricted by a bridge, located about 25 feet downstream, as shown in the overview photograph. The bridge opening measures approximately 24 feet wide by 11.5 feet high. When the water surface reaches elevation 71.0, about 1.5 feet above top of dam, the bridge opening becomes the hydraulic control. The road surface elevation at the bridge is 73.8 (MSL).

3.2 EVALUATION

Based on the visual inspection findings, the Chase Mill Dam appears to be in fair condition. There is heavy

leakage occurring through the joint between the spillway wall and the foundation sill. Erosion of the concrete in this joint is likely occurring and the leakage will likely become progressively worse. As outlined in Section 7, rehabilitative construction and maintenance is necessary to assure the long-term safety of the structure.

SECTION 4

OPERATING PROCEDURES

4.1 PROCEDURES

No written operational procedures were disclosed. Chase Mill Dam is the level controlling structure for Gardner Lake. Stop logs are placed or removed from the outlet bays and spillway crest to adjust the lake levels.

4.2 MAINTENANCE OF DAM

Chase Mill Dam is maintained by the Town of East Machias. It appears that the dam has received little maintenance in recent years.

4.3 MAINTENANCE OF OPERATING FACILITIES

The spillway stop logs are generally in fair condition. There appears to be no scheduled maintenance program for the dam.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT

No warning system is known to be in effect.

4.5 EVALUATION

The Chase Mill Dam operating facilities are generally in fair condition. Maintenance is sporadic and inadequate. It appears that removal of the stop logs would be very difficult during high flow conditions. No formal warning system for either highwater or structural distress is in effect at the dam.

SECTION 5

HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES

a. General. The Chase Mill Dam is a concrete buttress wall structure located at the east outlet of Gardner Lake. The dam is about 10 feet high and 45 feet long. The spillway consists of three controlled broad-crested weir sections with two sections having approximately the same crest elevation. There are three stop log outlet sections. See plan and profile drawing in Appendix B for location of individual sections. Stop logs were not being used in spillway sections 1 and 2 at the time of inspection. A natural outlet channel located about 300 feet west of the dam (west outlet #1), is controlled by a 4 foot diameter culvert under the roadway. A second natural outlet channel (west outlet #2), located about 600 feet west of the dam, discharges at flood stages and is also controlled by a 4-foot diameter culvert under the roadway. Flow would overtop the roadway at west outlet #2, but not at west outlet #1. There are no residences or other structures in the immediate area of west outlet #2 that would be affected by roadway overtopping.

b. Design Data. No design hydrologic or hydraulic data were available.

c. Experience Data. No information regarding past overtopping or other notable hydrological events was available.

d. Visual Observations. The outlet of Gardner Lake is hydraulically controlled by the Chase Mill Dam, west outlet #1 and west outlet #2. Leakage from beneath the spillway was estimated to be about 5 cfs. There was an estimated 15 cfs flow in west outlet #1. West outlet #2 discharges when Gardner Lake is at flood stage. At the time of the visual inspection, November 28, 1978, there was no flow at west outlet #2.

e. Test Flood Analysis. The Chase Mill Dam is classified as having a low hazard potential. Based on the Corps of Engineers "Recommended Guidelines for Safety Inspection of Dams," a test flood equal to 1/2 of the probable

maximum flood (PMF) was used in evaluating the dam's spillway capacity. The test flood was calculated to be about 13,000 cfs according to the COE's "Preliminary Guidance for Estimating Probable Maximum Discharges in Phase I Dam Safety Investigations". The test flood analysis is based on stop logs being in place as they were on the day of inspection. The effect of surcharge storage reduces the test flood to 2,250 cfs. The total project discharge (spillway capacity plus natural outlet flows) is about 950 cfs with water level at top of dam which is about 42 percent of the routed test flood (1/2 PMF). The routed test flood outflow would overtop the dam by 1.5 feet.

f. Dam Failure Analysis. To determine the hazard classification for the Chase Mill Dam, the potential impact of a failure of the dam when water surface is at the top of the dam was assessed. The failure analysis relied upon the Corps of Engineers' "rule of thumb" guidelines. The hazard potential was determined by calculating downstream dam failure hydrographs which might result from a breach of a section of the dam spillway.

The flood peak at the dam from failure plus the flow through the westerly natural outlets was computed to be about 1,450 cfs. Under these conditions, it would take the reservoir approximately one month to empty. The flood wave at the dam would be about 7.5 feet high. The wave height at the East Machias Dam, 2.1 miles downstream, would be about 6.0 feet. At both locations the flow would probably remain within the stream banks.

No residences appear to be potentially affected by failure of the dam. The possible damage seems to be limited to the road embankment and bridge just downstream of the dam.

Resistance to erosion from overtopping in the area east of the fishway may be considered poor. This area might also be subject to failure. It has been calculated that the roadway which is located about 25 feet downstream of the dam would not be overtopped by the 1/2 PMF.

SECTION 6

STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations. Based on the visual observations the Chase Mill Dam appears to be in fair condition. Heavy leakage is occurring through the joint between the spillway wall and its foundation sill. The open condition of this joint presents serious concern for the structural integrity of the spillway. Continued flow through this joint will cause further deterioration of the concrete and reinforcing steel, and additional distress.

The other concrete elements of the dam appear to be in good condition. The highway embankment which forms the dike portions of the dam also appears to be in good condition. There are some low areas in the earthfill adjacent to the fishway. Overtopping flow likely occurs through these areas during high run-off periods. However, no serious erosion appears to have occurred.

b. Design and Construction Data. According to an East Machias Selectman, the existing dam originally consisted only of piers constructed to support fish screens. During the late 1950's or early 1960's the concrete spillway wall was installed, replacing the screens, to control Gardner Lake water level. This modification was made to replace the breached former Mill Dam, immediately downstream. No specific data concerning the design or construction was disclosed in this investigation.

c. Operating Records. None available.

d. Post-Construction Changes. See paragraph b. above.

e. Seismic Stability. The dam is located in Seismic Zone 1 and in accordance with recommended Phase I guidelines, does not warrant seismic analysis.

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Condition. Based on the visual inspection and the apparent performance history of the Chase Mill Dam, it is assessed to be in fair condition. The test flood is 1/2 the probable maximum flood (1/2 PMF). The total project discharge including the capacity of the natural outlets is about 42% of the routed test flood. The inspection of the project resulted in the following major concerns:

(1) Heavy leakage is occurring through the junction of the spillway and foundation sill.

(2) The embankment adjacent to the fishway is low and subject to erosion from overtopping.

(3) It appears that removal of the stop logs would be very difficult during high flow conditions.

b. Adequacy of Information. The information available is such that the assessment of the condition of the dam must be based primarily on the visual inspection and engineering judgment.

c. Urgency. The recommendations and remedial measures outlined in 7.2 and 7.3 below should be implemented within 12 months after receipt of this report by the owner.

d. Need for Additional Investigation. Additional investigation is not considered necessary for the current assessment.

7.2 RECOMMENDATIONS

The need and appropriate construction details for a facility to provide access to the stop logs during high flow should be evaluated and developed by a qualified engineer and implemented as found necessary.

7.3 OPERATING AND MAINTENANCE PROCEDURES

A program of regular inspection and maintenance of the dam should be implemented and recorded. It should include the following specific maintenance and operating procedures:

1. Seal the joint at the junction of the spillway weir and the sill and the spillway weir and abutment to curtail leakage.

2. Fill the low portion of the embankment adjacent to the fishway to a grade at least two feet above the elevation of the northerly abutment and provide an erosion resistant surface.

3. Provide around-the-clock surveillance during periods of anticipated high runoff.

4. Have inspections of the dam made by qualified engineers once every 2 years.

7.4 ALTERNATIVES

An alternative to repair of the facility would be its removal.

APPENDIX A

VISUAL INSPECTON CHECK LIST

AND

SUPPLEMENTARY INSPECTION NOTES

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT Chase Mill Dam

DATE 11/28/78

TIME AM

WEATHER Snow, freezing rain

W.S. ELEV. 65.7 U.S. 60.5+ DN.S.

PARTY:

1. Stephen Cole
2. Brian Bisson
3. Scott Decker
4. John Kimble
5. Charles Goodwin
6.
7.
8.
9.
10.

	PROJECT FEATURE	INSPECTED BY	REMARKS
1.	Geotechnical	Cole	
2.	Structural	Cole, Decker	
3.	Civil	Decker	
4.	Hydraulics/Hydrology	Bisson	
5.	Photography	Bisson, Decker	
6.	Survey	Kimble, Goodwin	
	Review Inspection	S. Walker, C. Horstmann	
	12/14/78	No significant differences observed from previous inspection.	

NOTE: See Supplementary Inspection Notes Following Checklist

INSPECTION CHECKLIST

PROJECT Chase Mill Dam DATE 11/28/78

PROJECT FEATURE Embankment NAME Cole

DISCIPLINE Geotechnical NAME

AREA EVALUATED	CONDITIONS	
DAM EMBANKMENT		
Crest Elevation	69.5± MSL	NOTE: Embankme section consis highway downst of spillway of
Current Pool Elevation	67± MSL	
Maximum Impoundment to Date	Unknown	and backfill a fishway and no
Surface Cracks	None	abutment.
Pavement Condition	N/A	
Movement or Settlement of Crest	None	
Lateral Movement	None	
Vertical Alignment	Low areas near fishway	
Horizontal Alignment	Okay	
Condition at Abutment and at Concrete Structures	Low near fishway, no seepage apparent	
Indications of Movement of Structural Items on Slopes	None	
Trespassing on Slopes	None	
Sloughing or Erosion of Slopes or Abutments	Erosion has occurred near spi	
Vegetation	Turf	

AREA EVALUATED	CONDITIONS
DAM EMBANKMENT (cont.)	
Rock Slope Protection - Riprap Failures	None
Unusual Embankment or Downstream Seepage	None
Piping or Boils	None
Foundation Drainage Features	None
Toe Drains	None
Instrumentation System	None

INSPECTION CHECKLIST

PROJECT Chase Mill Dam DATE 11/28/78

PROJECT FEATURE Intake Channel Structure NAME Cole, Decker

DISCIPLINE Structural, Geotechnical Hydrology/Hydraulics NAME Bisson

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	
Slope Conditions	Natural shore of lake
Bottom Conditions	Gravel, sand, clean
Rock Slides or Falls	None
Log Boom	None
Debris	None
Condition of Concrete Lining	None
Drains or Weep Holes	None
b. Intake Structure	
Condition of Concrete	Good
Stop Logs and Slots	Good, some leakage around sto logs

INSPECTION CHECKLIST

PROJECT Chase Mill Dam DATE 11/28/78

PROJECT FEATURE Control Tower NAME Cole, Decker

DISCIPLINE Structural, Hydraulics/Hydrology NAME Bisson

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	
a. Concrete and Structural	
General Condition	
Condition of Joints	
Spalling	
Visible Reinforcing	
Rusting or Staining of Concrete	NOT APPLICABLE
Any Seepage or Efflorescence	
Joint Alignment	
Unusual Seepage or Leaks in Gate Chamber	
Cracks	
Rusting or Corrosion of Steel	
b. Mechanical and Electrical	
Air Vents	
Float Wells	
Gate Hoist	
Elevator	

AREA EVALUATED	CONDITIONS
OUTLET WORKS - CONTROL TOWER (cont.)	
Hydraulic System	
Service Gates	
Emergency Gates	
Lightning Protection System	
Emergency Power System	
Wiring and Lighting System	

INSPECTION CHECKLIST

PROJECT Chase Mill Dam DATE 11/28/78

PROJECT FEATURE Transition & Conduit NAME Cole, Decker

DISCIPLINE Structural, Hydraulics/Hydrology NAME Bisson

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	
General Condition of Concrete	Good
Rust or Staining on Concrete	None
Spalling	None
Erosion or Cavitation	Minor erosion
Cracking	None
Alignment of Monoliths	N/A
Alignment of Joints	Good
Numbering of Monoliths	N/A

PERIODIC INSPECTION CHECKLIST

PROJECT Chase Mill Dam DATE 11/28/78

PROJECT FEATURE Outlet Structure Channel NAME Cole, Decker

DISCIPLINE Geotechnical, Structural Hydraulics/Hydrology NAME Bisson

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	
General Condition of Concrete	Good
Rust or Staining	None
Spalling	None
Erosion or Cavitation	Minor erosion
Visible Reinforcing	None
Any Seepage or Efflorescence	None
Condition at Joints	Good
Drain holes	None
Channel	
Loose Rock or Trees Overhanging Channel	None
Condition of Discharge Channel	Bridge, restriction immediate downstream

INSPECTION CHECKLIST

PROJECT Chase Mill Dam DATE 11/28/78

PROJECT FEATURE Spillway NAME Cole, Decker

DISCIPLINE Structural, Hydraulics/Hydrology NAME Bisson

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
a. Approach Channel	
General Condition	Good
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None
Floor of Approach Channel	Gravel, sand, good
b. Weir and Training Walls	
General Condition of Concrete	Fair
Rust or Staining	None
Spalling	Downstream face of weir, south end
Any Visible Reinforcing	None
Any Seepage or Efflorescence	Heavy leakage near bottom of weir at joint to sill
Drain Holes	None
c. Discharge Channel	
General Condition	Good, sewer near bridge
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None
Floor of Channel	Gravel, cobbles
Other Obstructions	Bridge immediately downstream

INSPECTION CHECKLIST

PROJECT Chase Mill Dam DATE 11/28/78

PROJECT FEATURE Service Bridge NAME Decker

DISCIPLINE Civil NAME

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	
a. Superstructure	
Bearings	
Anchor Bolts	
Bridge Seat	
Longitudinal Members	
Under Side of Deck	
Secondary Bracing	NOT APPLICABLE
Deck	
Drainage System	
Railings	
Expansion Joints	
Paint	
b. Abutment & Piers	
General Condition of Concrete	
Alignment of Abutment	
Approach to Bridge	
Condition of Seat & Backwall	

CHASE MILL DAM

EAST MACHIAS, MAINE

APPENDIX A
SUPPLEMENTARY INSPECTION NOTES

1. CONCRETE STRUCTURES IN GENERAL

a. Concrete Surfaces.

The concrete surfaces of Chase Mill Dam were found to be in generally good condition. Some very minor erosion and spalling was noticed. There appeared to be no exposed reinforcing steel or staining of concrete.

b. Structural Cracking

No structural cracks were observed in any portions of the dam structure.

c. Movement, Horizontal and Vertical Alignment

The horizontal and vertical alignment of the concrete portions of the dam appear to be true to line and grade, with no apparent movement.

d. Junctions

The junctions of the concrete portions of the dam with the abutments appear to be in good condition.

e. Drains

No drains were observed to be located in the dam structure itself, however, drains were observed in the wing walls of the bridge immediately downstream from the dam. The drains beneath the bridge appear clear and some flow was observed in several of the drains.

f. Water Passages

The concrete surfaces of the stop log spillway were found to be in good condition with no evidence of erosion or cavitation. Some leakage was observed around the stop logs.

g. Seepage or Leakage

No leakage was observed at the junction between concrete bedrock in the north portion of the dam, or along the toe of the downstream face. However, a large amount of leakage is occurring through the joint between the dam foundation sill and the spillway wall. It appears that this joint is open and water is piping directly from the upstream face through to the downstream face. This leakage was estimated to be in excess of 2 cfs west of the center piers and in excess of 1/2 cfs in the easterly portion of the dam.

h. Monolith Joints and Construction Joints

Vertical joints in the dam appear to be in good condition, however, the horizontal joints between the concrete foundation sill and the vertical spillway face appear to be open. A large amount of leakage is occurring through this joint. The joint between the southerly wall of the stop log outlet section #1 and the spillway section #1 also is leaking, however, the joint appears to be relatively tight.

i. Foundation

The dam appears to be founded on bedrock. Bedrock is exposed at the north abutment. No foundation stress or evidence of undermining at the downstream toe was observed.

j. Abutments

The north abutment appears to be in good condition with good construction joints and a good bond between the concrete and bedrock foundation. The south abutment which is directly attached to the south wing wall of the downstream bridge shows no signs of distress.

2. EMBANKMENT STRUCTURES

The configuration of the dam is such that the roadway fill, for the road just west of the dam, comprises the embankment portions of the dam. At the south end of the dam the natural ground appears to rise sharply from the concrete abutment which minimizes the amount of embankment. On the north end there appears to be some

embankment material between the concrete abutment and fishway and west of the fishway.

a. Settlement

No evidence of settlement of the embankment materials in the dam were observed.

b. Slope Stability

The slopes of the embankment areas are very flat and there appear to be no problems with stability.

c. Seepage

None

d. Drainage Systems

None were observed.

e. Slope Protection

South of the south wing wall there is no upstream slope protection, however, there are no signs of erosion. There is no evidence of erosion between the north abutment and the fishway where riprap has been placed or along the flat slopes of the beach area north of the fishway.

3. SPILLWAY STRUCTURES

The spillway consists of three controlled broad-crested weir sections with two sections approximately the same concrete crest elevation. There are three deep stop log outlet sections. See plan-profile drawing in Appendix B for location of individual sections. Stop logs were not being used in spillway sections 1 and 2 at the time of inspection.

a. Control Gates and Operating Machinery

The only control facility at the Chase Mill Dam are the stop log sections. These stop logs could be removed manually as necessary. However, no facility is provided for removal of stop logs during high flow periods. There are no other gateworks at the dam.

b. Unlined Saddle Spillways

Unlined saddle spillways are located around the fishway section. The embankment area on the north sides of the spillway is low and appears to be overtopped frequently. The area is riprapped and little erosion has occurred. There is also an unlined spillway located approximately 300 feet to the west of the dam where a second outlet (west outlet #1) from Gardner Lake exists. There is no dam in this area and water flows through a culvert beneath the road. Substantial flow occurs in the channel even when water level is below the top of the dam spillway, however, no serious erosion has occurred. A third natural swale outlet from the lake (west outlet #2) is located about 600 feet west of the Dam. Flow apparently occurs in this outlet only when the lake level is very high.

c. Approach and Outlet Channels

The spillway approach channel is a cove of Gardner Lake. The approach channel is clear and unobstructed. The outlet channel is restricted by a bridge located immediately downstream of the dam.

d. Stilling Basin

The stilling basin below the spillway is the stream channel. No serious erosion or scour has occurred immediately downstream of the dam.

4. OUTLET WORKS

The outlet works at the Chase Mill Dam consists of a stop log outlet.

a. Intake Structure

The intake end of the inlet works consists of concrete piers which form walls for the stop log bay. The approach appears to be clear and unobstructed.

b. Operating and Emergency Control Gates

The stop log slots appear to be in good condition. Stop logs would have to be removed manually since there is no mechanical equipment for hoisting.

c. Conduits, Sluices and Water Passages

The surfaces of the concrete adjacent to the controlled outlet works appear to be in good condition with no cracks or spalling. Some very minor concrete surface erosion has occurred in and around the fishway.

d. Stilling Basin

The stilling basin is formed by the stream channel below the dam. No serious erosion or scour has occurred.

e. Approach and Outlet Channels

The approach channel was found to be clear and unobstructed. The outlet channel is somewhat restricted by a bridge located immediately downstream from the dam. No debris or major obstructions were observed in the outlet channel.

f. Drawdown Facilities

The three stop log outlets form the drawdown facility for the dam which could be used to lower the reservoir level during low runoff periods for maintenance on the dam.

5. SAFETY AND PERFORMANCE INSTRUMENTATION

Not applicable.

6. RESERVOIR

a. Shoreline

No major active or inactive landslide areas on Gardner Lake were observed.

b. Maintenance

Based on visual observations it appears that maintenance is done to the dam on an as-needed basis. However, no regular maintenance program is in effect. The condition of the dam was found to be in generally good repair, however, some major leakage is occurring between the sill and the upper face of the spillway section of the dam which presently needs maintenance and apparently has not been tended to.

APPENDIX B

ENGINEERING DATA

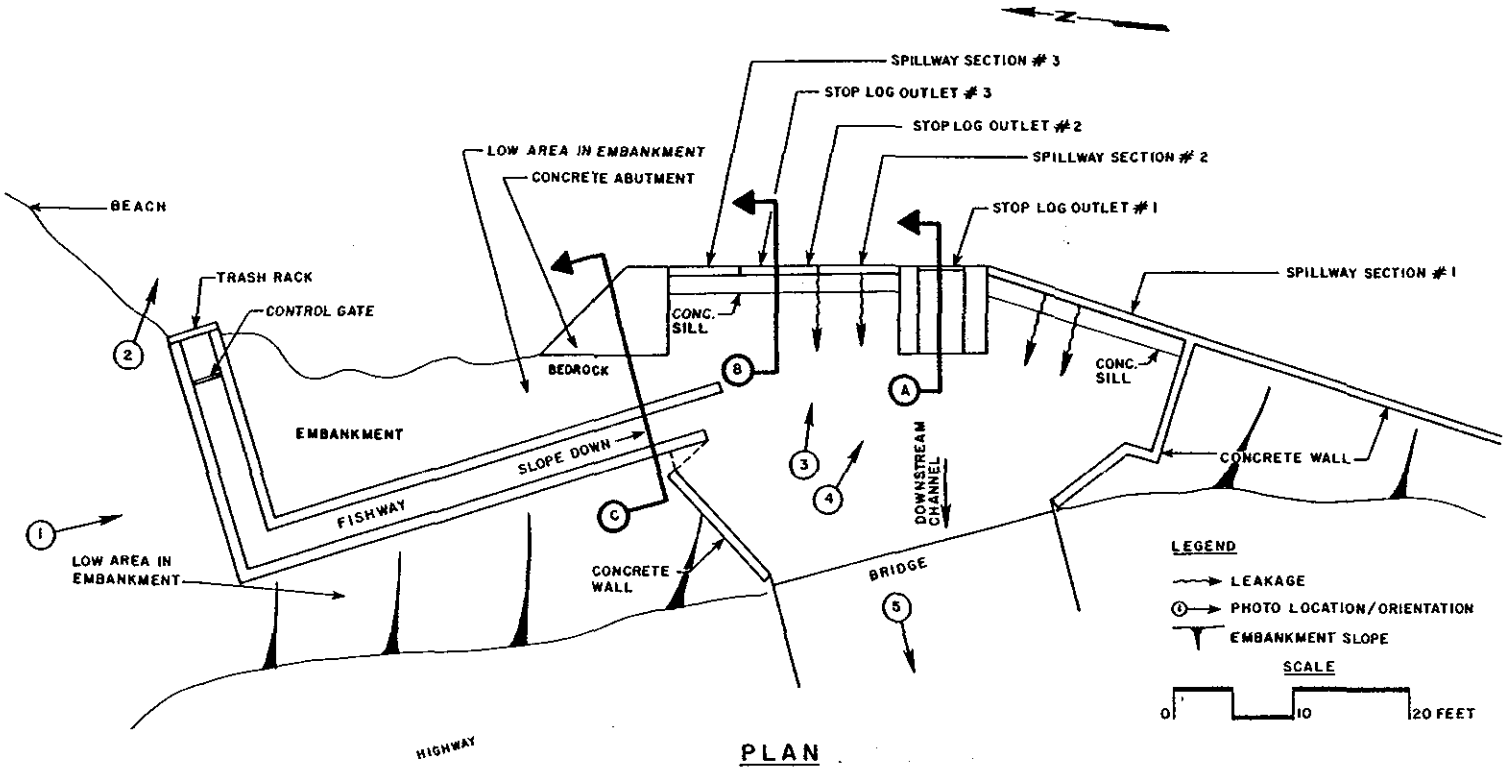
This appendix lists the engineering data collected either from project records or other sources of data developed as a result of the visual inspection. The contents of this appendix are listed below.

Appendix	Description
B-1	General Project Data

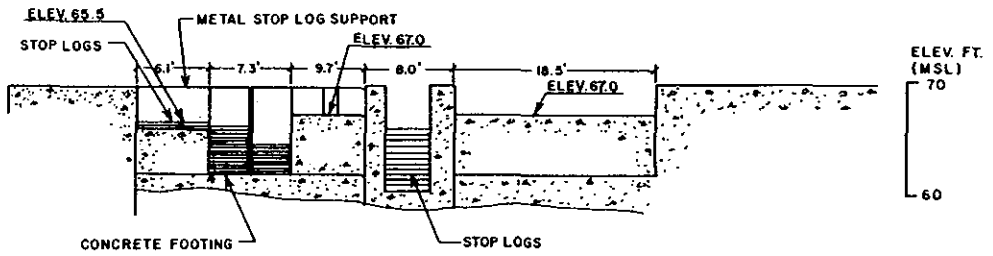
APPENDIX B-1

GENERAL PROJECT DATA

The following plan, profile and cross-sections of Chase Mill Dam were developed from a limited stadia survey performed during visual inspection, field notes taken by inspection team members, and photographs taken during the visual inspection. The survey was referenced to an arbitrary local datum. Approximate U.S.G.S. elevations were obtained by noting the dam's location on the U.S. Geologic Survey Gardner Lake, Maine quadrangle and assuming that the spillway crest is equal to normal water surface of Gardner Lake of approximate elevation 67 (MSL).



PLAN



DOWNSTREAM PROFILE

NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS

CHASE MILL DAM
PLAN & PROFILE

CHASE MILL STREAM MAINE

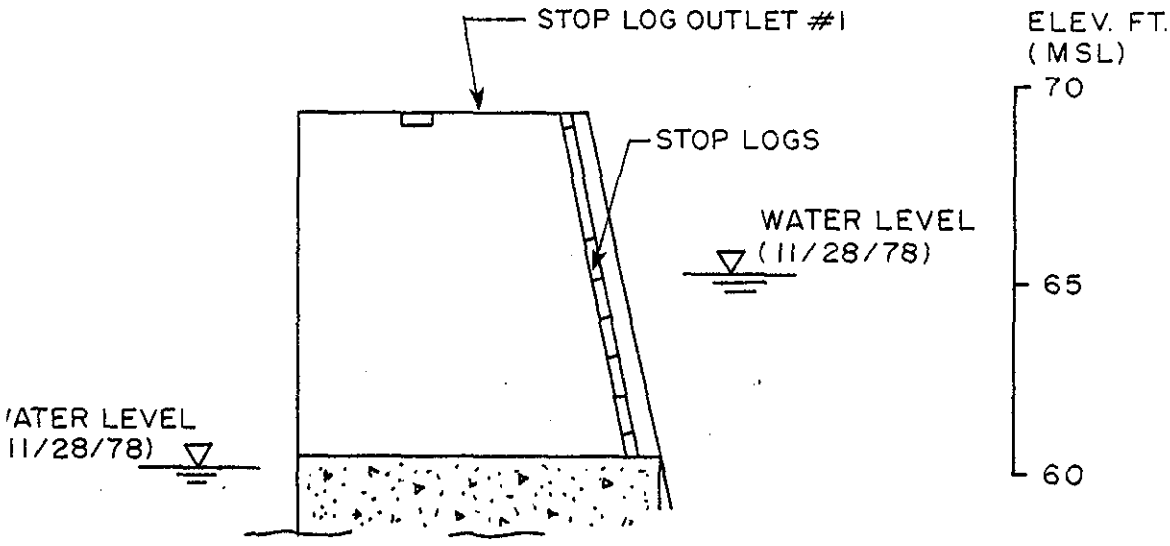
SCALE AS SHOWN

DATE MARCH 1979

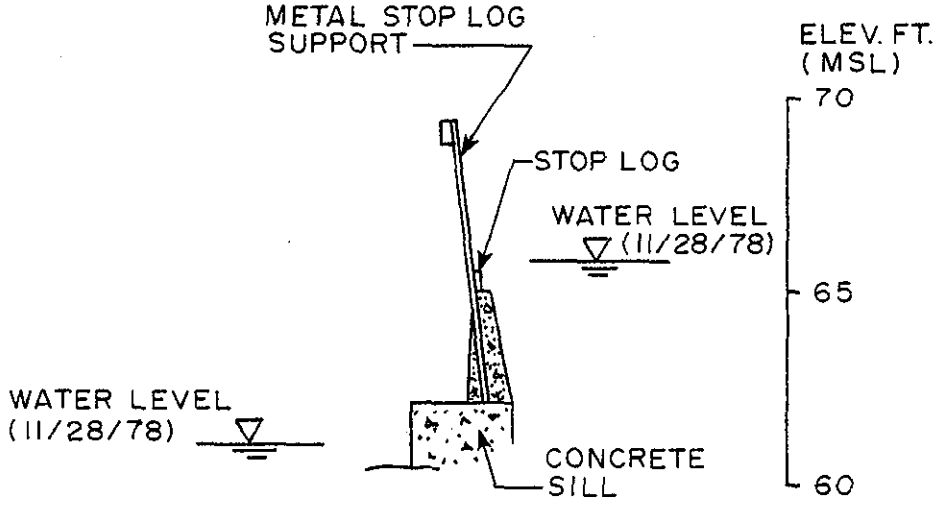
EDWARD C. JORDAN CO., INC. PORTLAND, MAINE

U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.

20793.17



SECTION A

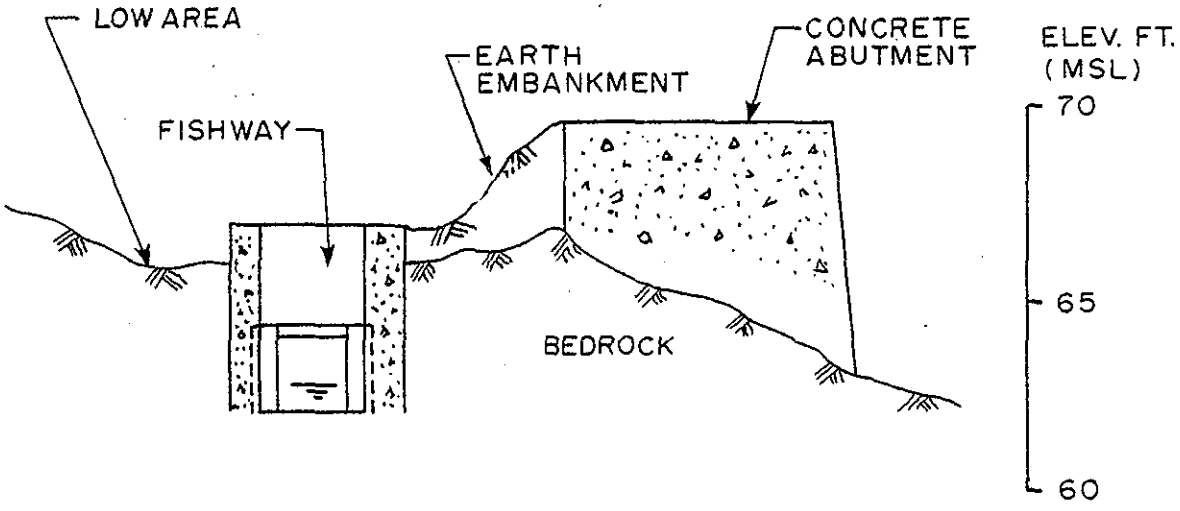


SECTION B

HORIZONTAL SCALE

0 5 10 FEET

EDWARD C. JORDAN CO., INC. PORTLAND, MAINE	U.S. ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	
CHASE MILL DAM X-SECTIONS	
CHASE MILL STREAM	MAINE
2079917	SCALE AS SHOWN DATE MARCH 1979



SECTION C

HORIZONTAL SCALE

0 5 10 FEET

EDWARD C. JORDAN CO., INC. PORTLAND, MAINE	U.S. ARMY ENGINEER DIV. NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS	
CHASE MILL DAM X-SECTION	
CHASE MILL STREAM	MAINE
20799 | 7	SCALE AS SHOWN DATE MARCH 1979

APPENDIX C

PHOTOGRAPHS

The following are photographs referenced in this report. See Sheet B-1 for photograph locations and orientations.

1

FISHWAY

2

VIEW UPSTREAM

3

LEAKAGE DOWNSTREAM FACE

4

DOWNSTREAM FACE

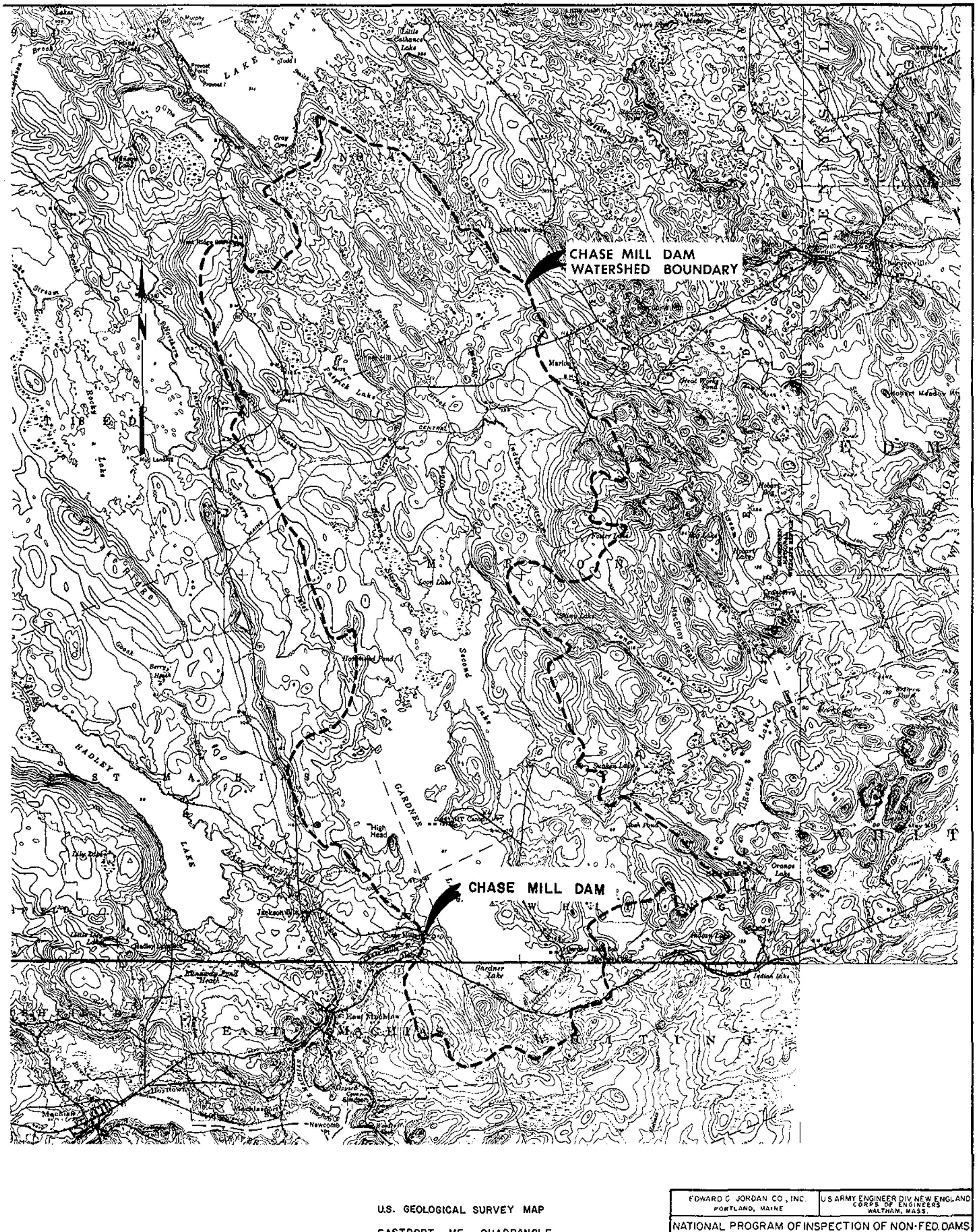
5

DOWNSTREAM CHANNEL

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

Hydrologic computations pertinent to this investigation are attached. The following drainage area map shows the watershed at Chase Mill Dam.



0 1 2 4MILES

U.S. GEOLOGICAL SURVEY MAP

EASTPORT, ME. QUADRANGLE
GARDNER LAKE, ME. QUADRANGLE
MACHIAS, ME. QUADRANGLE

EDWARD C. JORDAN CO., INC. PORTLAND, MAINE			US ARMY ENGINEER DIV NEW ENGLAND CORPS OF ENGINEERS WALTHAM, MASS.
NATIONAL PROGRAM OF INSPECTION OF NON-FED. DAMS			
CHASE MILL DAM DRAINAGE AREA MAP			
CHASE MILL STREAM			ME.
			SCALE AS SHOWN
2079917			DATE MARCH 1979

PROJECT	COMP BY	JOB NO.
AREAS CHASE MILL DAM	BTB	20799 17
	CHK BY JJD	DATE 2-13-79

ITEM	AREA Measured From USGS Quads In^2	AREA Mi^2	AREA Acres
D.A. @ Chase Mills Dam	52.5	52.5	33600
Gardner Lake @ EL 67	8.2	8.2	5248
Gardner Lake @ EL 80	13.8	13.8	8832
E. Machais Reservoir @ Normal	0.22	0.22	141
E Machais Reservoir @ EL 40'	0.47	0.47	301

USGS MSL DATUM EL 67' = SURVEY DATUM EL 97.5'

FROM COE INVENTORY OF DAMS:

Normal Impounding Capacity = 27500 Ac-Ft
Maximum " " = 32900 Ac-Ft

NORMAL CAPACITY CALCULATED:
5248 (5) = 26240 Ac-Ft. ≈ 27,500 Ac-Ft OK

MAXIMUM CAPACITY (AT TOP OF DAM):

$27500 + 2.5\left[\ 5524\ '\ \right] = 41{,}310$ Ac-Ft.

USE FOR MAX CAPACITY

PROJECT	COMP BY	JOB NO.
CHASE MILL DAM HYDRAULICS	BTB	20799 17
	CHK BY JJD	DATE 2-12-7

WEIR DESIGNATION	SURVEY DATUM ELEV	MSL DATUM ELEV	LENGTH [1]	C
Spillway	97.5	67.0	41.6	Varies
Top of Dam	100.0	70.0	21.0	"
Gate Structure (w/stop logs in place)	96.4	65.9	4.0	"
Bridge Roadway	104.3	73.8	100.	"

[1] LENGTHS ARE EFFECTIVE LENGTHS

5–40 HANDBOOK OF HYDRAULICS
KING & BRATER

Table 5-3. Values of C in the Formula $Q = CLH^{3/2}$ for Broad-crested Weirs

Measured head in feet, H	Breadth of crest of weir in feet										
	0.50	0.75	1.00	1.50	2.00	2.50	3.00	4.00	5.00	10.00	15.00
0.2	2.80	2.75	2.69	2.62	2.54	2.48	2.44	2.38	2.34	2.49	2.68
0.4	2.92	2.80	2.72	2.64	2.61	2.60	2.58	2.54	2.50	2.56	2.70
0.6	3.08	2.89	2.75	2.64	2.61	2.60	2.68	2.69	2.70	2.70	2.70
0.8	3.30	3.04	2.85	2.68	2.60	2.60	2.67	2.68	2.68	2.69	2.64
1.0	3.32	3.14	2.98	2.75	2.66	2.64	2.65	2.67	2.68	2.68	2.63
1.2	3.32	3.20	3.08	2.86	2.70	2.65	2.64	2.67	2.66	2.69	2.64
1.4	3.32	3.26	3.20	2.92	2.77	2.68	2.64	2.65	2.65	2.67	2.64
1.6	3.32	3.29	3.28	3.07	2.89	2.75	2.68	2.66	2.65	2.64	2.63
1.8	3.32	3.32	3.31	3.07	2.88	2.74	2.68	2.66	2.65	2.64	2.63
2.0	3.32	3.31	3.30	3.03	2.85	2.76	2.72	2.68	2.65	2.64	2.63
2.5	3.32	3.32	3.31	3.28	3.07	2.89	2.81	2.72	2.67	2.64	2.63
3.0	3.32	3.32	3.32	3.32	3.20	3.05	2.92	2.73	2.66	2.64	2.63
3.5	3.32	3.32	3.32	3.32	3.32	3.19	2.97	2.76	2.68	2.64	2.63
4.0	3.32	3.32	3.32	3.32	3.32	3.32	3.07	2.79	2.70	2.64	2.63
4.5	3.32	3.32	3.32	3.32	3.32	3.32	3.32	2.88	2.74	2.64	2.63
5.0	3.32	3.32	3.32	3.32	3.32	3.32	3.32	3.07	2.79	2.64	2.63
5.5	3.32	3.32	3.32	3.32	3.32	3.32	3.32	3.32	2.88	2.64	2.63

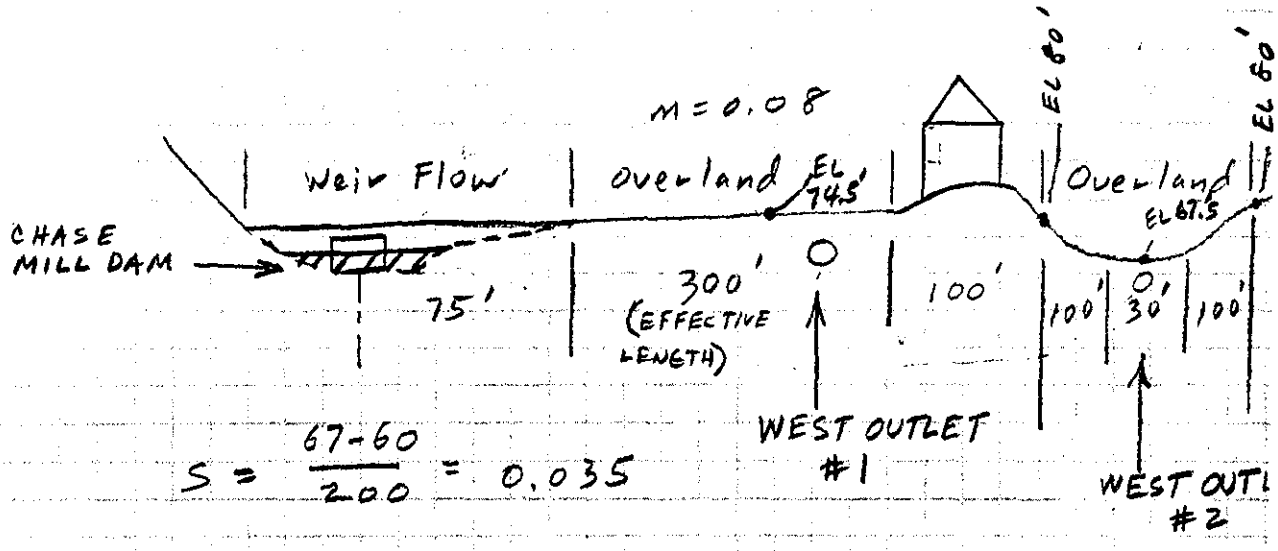
PROJECT	COMP BY	JOB NO.
HYDRAULICS	BTB	20799 17
	CHK BY JJD	DATE 2-12-79

$Q = C L H^{3/2}$

SURVEY DATUM ELEV.	HEIGHT ABOVE MSL	L = 41.6' SPILLWAY Q CFS	L = 21.0' TOP OF DAM Q, CFS	L = 4.0' SPILLWAY GATE Q, CFS	TOTAL DAM FLOW CFS
96	66	—	—	—	
	67	—	—	6	6
98	68	42	—	27	69
	69	250	—	56	306
100	70	546	—	91	637
	71	904	55	131	1090
102	72	1318	157	176	1651*
	73	1781	288	225	2294*
104	74	2289	444	278	3011*
106					
108					
110					
112					
114					

*Bridge Opening Hydraulically controls

PROJECT	COMP BY	JOB NO.
OVERLAND FLOW HYDRAULICS	BTB	20799 17
	CHK BY JJD	DATE 2-12-79



$$S = \frac{67-60}{200} = 0.035$$

$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$

SURVEY DATUM ELEV	MSL DATUM ELEV	AREA, Ft²	$R^{2/3}$	Q, cfs
98	67.5	—	—	0
				104
100	69.5	93	0.975	315
		165	1.621	929
102	71.5	253	1.909	1678
		358	2.155	2681
104	73.5	480	2.390	3987
		618	2.611	5607
106	75.5	1074	1.751	6535
		1545	2.181	11709
108	77.5	2033	2.560	18088
		2538	2.904	25610

- Flow through culverts insignificant.
- Weir flow would occur in the area of the bridge (just downstream of the dam) at high stages.
- Overland flow would occur at West Outlet #1 & #2 at high stages.

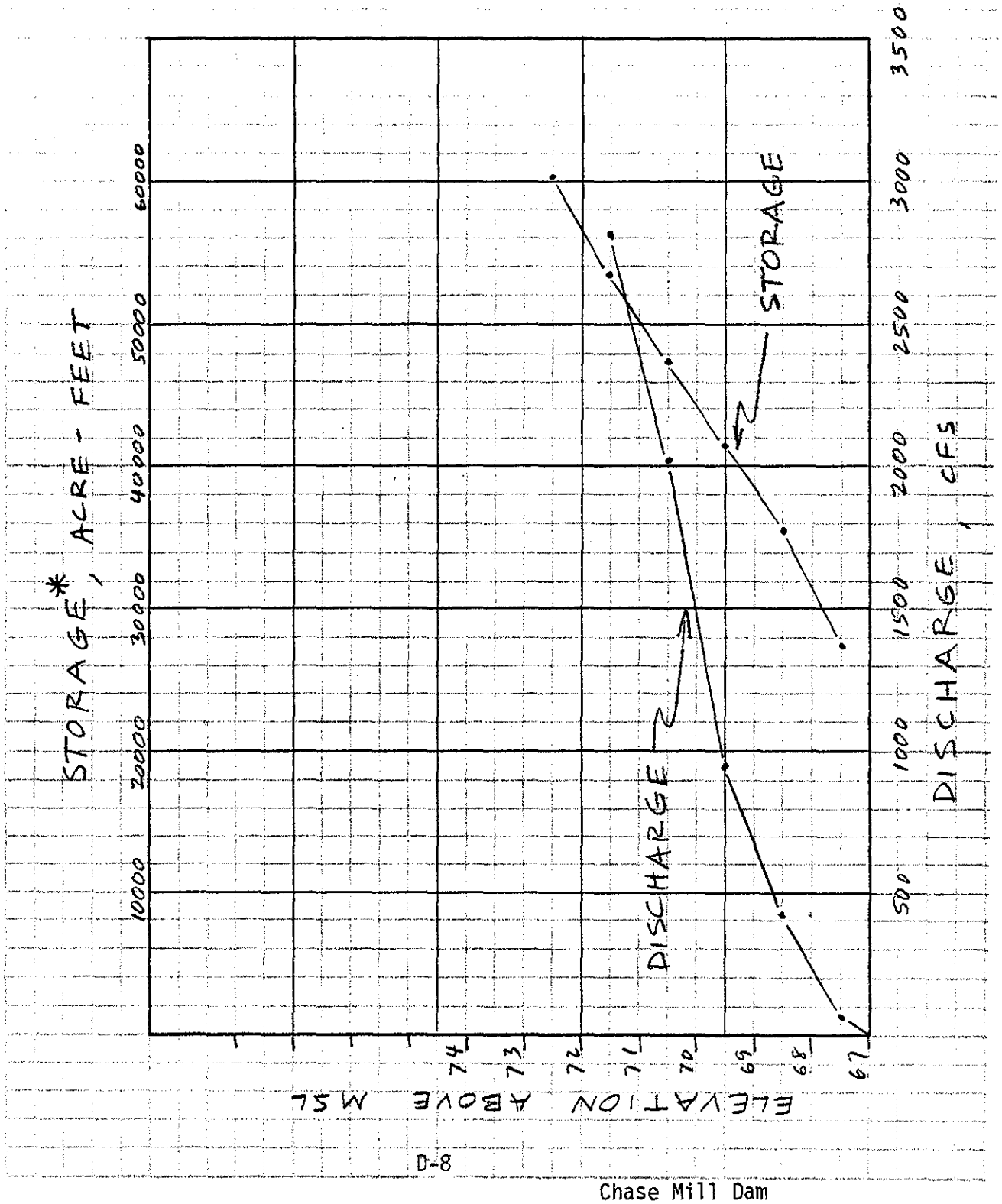
PROJECT	COMP BY	JOB NO.
HYDRAULICS	BTB	20799 17
	CHK BY JJD	DATE 2-12-79

SURVEY DATUM ELEV	MSL DATUM ELEV	BRIDGE PRES. FLOW * CFS ($Q = CA\sqrt{2gh}$)	BRIDGE WEIR FLOW CFS	OVERLAND FLOW CFS	TOTAL PROJECT FLOW CFS
96	65.5	6			6
98	67.5	69		0	69
100	69.5	306		104	410
102	71.5	637		315	952
104	73.5	1090		929	2019
106	75.5	1124	152	1678	2802
108	77.5	1947	576	2681	4628
110	79.5	2513	1154	3987	6500
112	81.5		1850	5607	8272
114	83.5		2649	6535	9624
			3538	11709	15376
			4509	18088	22451
			5555	25610	30772
			6672		
			7855		

* Dam Controls until bridge opening becomes submerged at 101.5, then pressure flow results at elev > 71.0'

BRIDGE AREA = 283 SQ FT

PROJECT	COMP BY	JOB NO.
STORAGE - DISCHARGE CURVE	BTB	20799 17
	CHK BY	DATE
	JTD	5-21-79



Chase Mill Dam

PROJECT	COMP BY	JOB NO.
STORAGE - DISCHARGE TABLE	BTB	20799 17
	CHK BY JD	DATE 2-13-79

MSL DATUM	SURVEY DATUM ELEV	Head Above Spillway Crest, ft	AREA Acres	* STORAGE Ac-Ft	DISCHARGE CFS
65.5	96				
67.5	98	0.5	5248	27500	69
			5524	35579	410
69.5	100	2.5	5799	41310	952
			6075	47315	2019
71.5	102	4.5	6351	53598	2802
			6626	60153	4628
73.5	104	6.5	6902	66987	6500
			7178	74098	8272
75.5	106	8.5	7454	81484	9624
			7729	89141	15376
77.5	108	10.5	8005	97078	22451
			8281	105292	30772
79.5	110	12.5	8556	113775	
			8832	129580	
81.5	112	14.5			
	114				

*For Storage Above Spillway Crest Subtract 27500 Ac-Ft.

PROJECT	COMP BY	JOB NO.
PMF CALCULATION	BTB	20799 17
	CHK BY JJD	DATE 2-13-79

According to "PRELIMINARY GUIDANCE FOR ESTIMATING MAX PROBABLE DISCHARGE" by COE:

For Flat D.A. = 52.5 Sq Mi, Q = 500CSM

$Q = 500(52.5) = 26250$ CFS = PMF

13125 CFS = ½ PMF

ESTIMATING EFFECT OF SURCHARGE STORAGE:

$$Q_{p2} = Q_{p2} \times \left(1 - \frac{STOR_1}{Runoff}\right)$$

PMF Runoff = 19" ; ½ PMF Runoff = 9.5"

(1) PMF

a) Elev. to pass Q_{p1} (PMF) = 108.5

$STOR_1 = 100828 - 27500 = 73328$ Ac-Ft

OR $\frac{73328}{33600} \times \frac{12 in}{ft} = 26.19"$

$Q_{p2} = 26250\left(1 - \frac{26.19}{19}\right) = 0$

b) Elev. to pass Q_{p2} = 97.5

$STOR_2 = 0$

$STOR_{AVE} = 13.1"$

PROJECT	COMP BY	JOB NO.
PMF	BTB	20799 17
	CHK BY JJD	DATE 2-13-79

$$Q_{p3} = 26250\left(1 - \frac{13.1}{19}\right) = 8151$$

(c) Elev to pass Q_{p3} = 104.9

$STOR_3 = 73614 - 27500 = 46114$ Ac-Ft

OR $\frac{46114}{33600} \times 12 = 16.47"$

$STOR_{AVE} = \frac{16.47 + 13.1}{2} = 14.78"$

$$Q_{p4} = 26250\left(1 - \frac{14.78}{19}\right) = 5824$$

(d) Elev. to pass Q_{p4} = 103.6'

$STOR_4 = 64519 - 27500 = 37019$ Ac-Ft

OR $\frac{37019}{33600} \times 12 = 13.22"$

$STOR_{AVE} = \frac{14.78 + 13.22}{2} = 14.00"$

$$Q_{p5} = 26250\left(1 - \frac{14}{19}\right) = 6908$$

(e) Elev. to pass Q_{p5} = 104.2'

$STOR_5 = 68624 - 27500 = 41124$

OR $\frac{41124}{33600} \times 12 = 14.69$

$STOR_{AVE} = \frac{14.00 + 14.69}{2} = 14.34"$

PROJECT	COMP BY	JOB NO.
PMF & ½ PMF	BTB	20799 17
	CHK BY JJD	DATE 2-13-79

$$Q_{p6} = 26250\left(1 - \frac{14.34}{19}\right) = \underline{6433}\ \text{CFS}$$

(f) Elev. to pass Q_{p6} = 104.0'

Top of Road at Dam is 104.3' at Lowest Point.

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2) ½ PMF

a) Elev. to pass Q_{p1} (½ PMF) = 106.6'

$STOR_1 = 86144 - 27500 = 58644$ Ac-Ft

OR $\frac{58644}{33600} \times 12\frac{in}{ft} = 20.94"$

$Q_{p2} = 13125\left(1 - \frac{20.94}{9.5}\right) = 0$

b) Elev. to pass Q_{p2} = 97.5

$STOR_2 = 0$

$STOR_{AVE} = 10.47"$

$Q_{p3} = 13125\left(1 - \frac{10.47}{9.5}\right) = 0$

c) Elev. to pass Q_{p3} = 97.5

$STOR_3 = 0$

$STOR_{AVE} = 5.24"$

$Q_{p4} = 13125\left(1 - \frac{5.24}{9.5}\right) = 5892$ CFS

PROJECT	COMP BY	JOB NO.
1/2 PMF	BTB	20799 17
	CHK BY JJD	DATE 2-13-79

d) Elev. to pass $Q_{P4} = 103.7$

$STOR_4 = 64767 - 27500 = 37267 Ac\text{-}Ft$

OR $\frac{37267}{33600} \times 12 = 13.31"$

$STOR_{AVE} = \frac{13.31 + 5.24}{2} = 9.27"$

$Q_{P5} = 13125\left(1 - \frac{9.27}{9.5}\right) = 311 CFS$

e) Elev. to pass $Q_{P5} = 98.7$

$STOR_5 = 33234 - 27500 = 5734 Ac\text{-}Ft$

OR $\frac{5734}{33600} \times 12 = 2.05"$

$STOR_{AVE} = \frac{2.05 + 9.27}{2} = 5.66"$

$Q_{P6} = 13125\left(1 - \frac{5.66}{9.5}\right) = 5307 CFS$

f) Elev. to pass $Q_{P6} = 103.4$

$STOR_6 = 62631 - 27500 = 35131 Ac\text{-}Ft$

OR $\frac{35131}{33600} \times 12 = 12.55"$

$STOR_{AVE} = \frac{12.55 + 5.66}{2} = 9.10"$

PROJECT	COMP BY	JOB NO.
1/2 PMF	BTB	20799 17
	CHK BY JJD	DATE 2-13-79

$$Q_{p7} = 13125\left(1 - \frac{9.10}{9.5}\right) = 548 \text{ CFS}$$

g) Elev. to pass $Q_{p7} = 99.3'$

$STOR_7 = 37037 - 27500 = 9537$ Ac-Ft

OR $\frac{9537}{33600} \times 12 = 3.41"$

$STOR_{AVE} = \frac{3.41 + 9.10}{2} = 6.25"$

$Q_{p8} = 13125\left(1 - \frac{6.25}{9.5}\right) = 4486 \text{ CFS}$

h) Elev. to pass $Q_{p8} = 102.9'$

$STOR_8 = 59643 - 27500 = 32143$ Ac-Ft

OR $\frac{32143}{33600} \times 12 = 11.48$

$STOR_{AVE} = \frac{11.48 + 6.25}{2} = 8.86$

$Q_{p9} = 13125\left(1 - \frac{8.86}{9.5}\right) = 878 \text{ CFS}$

i) Elev. to pass $Q_{p9} = 99.9'$

$STOR_9 = 40523 - 27500 = 13023$ Ac-Ft

OR $\frac{13023}{33600} \times 12 = 4.65"$

$STOR_{AVE} = \frac{4.65 + 8.86}{2} = 6.75"$

PROJECT	COMP BY	JOB NO.
½ PMF	BTB	20799 17
	CHK BY JJD	DATE 2-13-79

$$Q_{P10} = 13125\left(1 - \frac{6.75}{9.5}\right) = 3792$$

j) Elev. to pass $Q_{P10} = 102.5$

$STOR_{10} = 57151 - 27500 = 29651$ Ac-Ft

OR $\frac{29651}{33600} \times 12 = 10.59"$

$STOR_{AVE} = \frac{10.59 + 6.75}{2} = 8.67"$

$Q_{P11} = 13125\left(1 - \frac{8.67}{9.5}\right) = 1147$ CFS

k) Elev. to pass $Q_{P11} = 100.2'$

$STOR_{11} = 42407 - 27500 = 14907$ Ac-Ft

OR $\frac{14907}{33600} \times 12 = 5.32"$

$STOR_{AVE} = \frac{5.32 + 8.67}{2} = 7.00"$

$Q_{P12} = 13125\left(1 - \frac{7.00}{9.5}\right) = 3461$ CFS

ℓ) Elev. to pass $Q_{P12} = 102.4'$

$STOR_{12} = 55963 - 27500 = 28463$ Ac-Ft

OR $\frac{28463}{33600} \times 12 = 10.17"$

$STOR_{AVE} = \frac{10.17 + 7.00}{2} = 8.58"$

PROJECT	COMP BY	JOB NO.
½ PMF	BTB	20799 17
	CHK BY JJD	DATE 2-13-79

$$Q_{p13} = 13125\left(1 - \frac{8.58}{9.5}\right) = 1267$$

m) Elev. to pass $Q_{p13} = 100.3$

$STOR_{13} = 43085 - 27500 = 15585$ Ac-Ft

OR $\frac{15585}{33600} \times 12 = 5.57"$

$STOR_{AVE} = \frac{5.57 + 8.58}{2} = 7.07"$

$Q_{p14} = 13125\left(1 - \frac{7.07}{9.5}\right) = 3353$ CFS

m) Elev. to pass $Q_{p14} = 102.3$

Elev to pass ½ PMF = $\frac{100.3 + 102.3}{2} = 101.3'$

FLOW = 2254 CFS

Both the ½ PMF & PMF flood stage at the dam is below the bridge roadway just downstream of the dam. However, the roadway at west outlet #2 would be inundated by both the ½ PMF & PMF.

PROJECT	COMP BY	JOB NO.
DAM FAILURE HYDROGRAPHS	BTB	20799 17
	CHK BY	DATE
	JJD	2-13-79

Likely Location For Failure:

Either of 2 spillways; use longest spillway section (same likelyhood of failure for either)

$$Q_{p1} = 8/27\ W_b \sqrt{g}\ Y_b^{3/2}$$

$$1/2\ Q_p T = 12.1 S$$

$$Q_{p1} = 8/27\ (23.1)\sqrt{g}\ (7.5)^{3/2} = 798\ cfs$$

Flow through West Outlet #2
@ El 69.5' = 315 cfs

Remainder of Dam Flow = 334 cfs

Total Q_{p1} = 1447 cfs @ confluence of Chase Mills Stream East & West Channels

$$T = \frac{12.1 S}{1/2\ Q_p} = \frac{12.1 (41310)}{1/2\ (1447)} = 691\ hrs$$

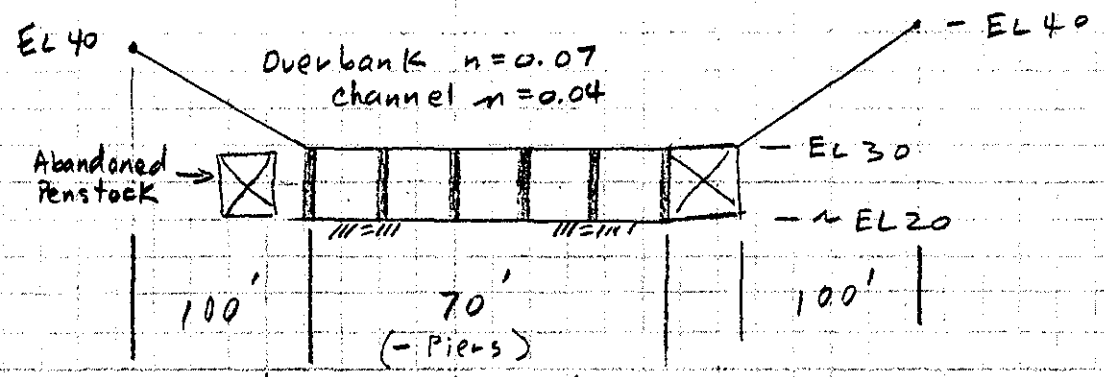
$T \cong$ 1 month

PROJECT	COMP BY	JOB NO.
RATING CURVE AT E. MACHAIS DAM	BTB	20799 17
	CHK BY JD	DATE 2-13-79

5 Bays that pass flow. (Bottom of bays at channel invert).
width of bays ≅ 14'

$$\text{Slope} = S = \frac{30-20}{3.6 \times 5280} = 0.00095$$

$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$



ELEV	CHANNEL FLOW cFS	TOTAL FLOW cFS	AREA Acres	STORAGE Ac-Ft
20	—	—	0	—
	79	79	28	28
	245	245	56	112
	474	474	85	255
	753	753	113	452
25	1074	1074	141	705
	1428	1428	152	912
	1818	1818	162	1134
	2238	2238	173	1384
	2684	2684	184	1656
30	3150	3150	194	1940
	3694	3698	205	2255
	4270	4296	216	2592
	4876	4953	226	2938
	5521	5687	237	3318
35	6192	6493	248	3720
40			301	

PROJECT	COMP BY	JOB NO.
RATING CURVE AT E. MACHAIS DAM	BTB	2079917
	CHK BY JJD	DATE 2-13-79

ELEV	Channel Area	Channel $R^{2/3}$	Overbank Area	Overbank $R^{2/3}$	Total Q, cfs
20	—	—	—	—	
	70	.98	—	—	79
	140	1.53	—	—	245
	210	1.97	—	—	474
	280	2.35	—	—	753
25	350	2.68	—	—	1074
	420	2.97	—	—	1428
	490	3.24	—	—	1818
	560	3.49	—	—	2238
	630	3.72	—	—	2684
30	700	3.93	—	—	3150
	770	4.19	10	0.63	3698
	840	4.44	40	1.00	4296
	910	4.68	90	1.31	4953
	980	4.92	160	1.59	5687
35	1050	5.15	250	1.84	6493
	1120	5.37	360	2.08	
	1190	5.60	490	2.31	

$$Q = \frac{1.486}{n} A R^{2/3} S^{1/2}$$

PROJECT	COMP BY	JOB NO.
Dam Failure Hydrographs	BTB	20799 17
	CHK BY JJD	DATE 2-13-79

$Q_{p1} = 1447$ CFS

$S = 41310$

$$Q_{p_2}(TRIAL) = Q_{p1}\left(1 - \frac{V_1}{S}\right)$$

$$Q_{p2}(TRIAL) = 1447\left(1 - \frac{912}{41310}\right) = 1415 \text{ CFS}$$

NO SIGNIFICANT ROUTING EFFECT.

FLOOD STAGE @ ~ EL 26' @ E Machais Dam.

∴ Flow retained within River Banks

No Damage in Village of E. Machais.

PROJECT	COMP BY	JOB NO.
CLASSIFICATION	BTB	20799 17
	CHK BY JJD.	DATE 2-13-79

According to "RECOMMENDED GUIDELINES FOR SAFETY INSPECTION OF DAMS":

Chase Mills Dam is an Intermediate sized Dam:

Storage = 41300 Ac-Ft

Height = 9.0'

From Guidelines → Storage ≥1000 & <50,000
OR Height ≥40' & <100'

Hazard Potential Classification:

LOW

∴ Recommended Spillway design Flood is 100yr to ½ PMF

USE ½ PMF

Routed ½ PMF = 2250 CFS @ EL 101.3 (SURVEY DATUM)

Total Project Capacity at EL 100 (Top of Dam) = 950

Spillway Capacity = 42% of ½ PMF

APPENDIX E

Information as Contained in the National Inventory of Dams

Chase Mill Dam, East Machias, Maine: phase I inspection report, National Dam Inspection Program. -- Waltham, Mass. : U.S. Army Corps of Engineers, New England Division, 1979.
vi, [50] p. : ill., maps ; 28 cm. -- (ME00335)
"May 1979"
1. Dams--Inspection--Maine--Chase Mill Dam. 2. Dam safety--Maine--Chase Mill Dam. 3. Chase Mill Dam (Me.)--Inspection. 4. East Machias (Me.)--Dams. 5. East Machias River watershed (Me.)--Dams. I. United States. Army. Corps of Engineers. New England Division. II. Series